

1 **SKATE WHEEL HAVING SKEW-MOUNTED AND SELF-**
2 **POWERED ILLUMINATING DEVICES**

3 **BACKGROUND OF THE INVENTION**

4 1. Field of the Invention

5 The present invention relates to a skate wheel having skew-mounted and
6 self-powered illuminating devices, particularly to a roller wheel for in-line
7 skates or skate boards that are equipped with skew-mounted illuminating devices
8 and means of generating the necessary electricity to supply the illuminating
9 devices.

10 2. Description of Related Art

11 In-line skates and skate boards are sports items popular with teenagers, as
12 they are suitable both for leisure activities and exercise. By using in-line skates
13 or skate boards to do difficult acts with advanced skills, teenagers find a sense of
14 accomplishment and a venue for self-expression. Therefore, many skating fans
15 like to wear sportive gear and clothing to show off their personal styles, and
16 install light or sound producing devices on the in-line skates or skate boards.

17 These in-line skates or skate boards, when in use, can produce the light or sound
18 effects to catch the attention of spectators. The in-line skate equipped with
19 illuminating devices is intended to amuse the crowds as the in-line skate can
20 produce a light trail following the movement of the skater.

21 Most illuminating devices are installed inside the roller wheels of in-line
22 skates or skate boards to produce the light as the wheels rotate on the axle. The
23 illuminating device is conventionally installed on the hub and inside the wheel,
24 perpendicular to the axis of the wheel; that means the illuminating device is

1 radially mounted on the hub extending towards the circumference of the wheel.
2 However, the illuminating device, when in use, can be easily scratched against
3 the ground or by other obstacles causing abrasion on the surface of the
4 illuminating device. As a result, light emission from the illuminating device will
5 be partially diffracted by the uneven surface on the illuminating device, thus the
6 light effects are attenuated.

7 Further, since the conventional illuminating devices are protruded from
8 the hub, these illuminating devices cannot fit in wheels with particularly small
9 diameters. Therefore, the conventional design of the illuminating devices is
10 hampering efforts to create wider applications.

11 SUMMARY OF THE INVENTION

12 The main object of the present invention is to provide a modified skate
13 wheel that is capable of incorporating a skew-mounted illuminating device. The
14 design of the illuminating device for installation with a skew angle (1) is able to
15 reduce the diameter requirement for the wheel, (2) allows the light produced by
16 the illuminating device to irradiate from the lateral side of the wheel, and (3)
17 reduces the chance of scratching on the surface of the illuminating device, thus
18 preventing the diffraction of light that will attenuate the light effects.

19 The second object of the present invention is to provide an illuminating
20 device that is embedded with means of generating the necessary electricity to
21 supply the illuminating device. Therefore, the illuminating device does not need
22 any external power source.

23 To this end, the skate wheel incorporating skew-mounted and self-powered
24 illuminating devices comprises:

1 two opposing and mutually coupling anchors having a recessed portion on
2 the side opposing each other, together creating a chamber between the two
3 anchors;

4 a ring-shaped rotor being placed in the chamber between the two anchors,
5 wherein the rotor is able to rotate synchronously with the motion of the coupled
6 anchors;

7 multiple illuminating devices installable with a skew angle on the rotor,
8 wherein each illuminating device has two terminals, one terminal being
9 connected to one of the two metal plates over the rotor, another terminal being
10 connected to the junction linking with the induction coil of the rotor;

11 a stator being fitted in the rotor, but not in physical contact with the rotor;

12 an axle extending through the two anchors and the stator; and

13 a protective covering, made of translucent materials, being placed around
14 the circumference and the lateral sides of the two anchors.

15 According to the present invention, there are multiple pairs of projected
16 portions and sunken portions formed on the rim of the coupled anchors. The
17 projected portions appear on the first anchor, and the sunken portions on the
18 second anchor, wherein each pair of projected portion and sunken portion has a
19 skewness that corresponds with the skew angle of the illuminating device to be
20 installed on the anchor. The projected portions and sunken portions on the rim of
21 the anchors are used for interlocking the two anchors and holding the
22 illuminating devices.

23 According to the present invention, the rotor is formed by a ring-shaped
24 induction coil and two metal plates, wherein the induction coil is formed by a

1 wire wound around a circular core, and the two metal plates are joined together
2 holding the induction coil in the middle, with one end of the coil being connected
3 to the mutually coupled metal plates.

4 Since the illuminating device is installed with a skew angle on the rim of
5 the coupled anchors, the installed illuminating device appears with a low profile.
6 Therefore, the diameter of the wheel required to cover the hub can be reduced in
7 size as compared with conventional design of the illuminating devices, and the
8 chance of scratching the surface of the illuminating device can be minimized.

9 Other objectives, advantages and novel features of the invention will
10 become more apparent from the following detailed description when taken in
11 conjunction with the accompanying drawings.

12 BRIEF DESCRIPTION OF THE DRAWINGS

13 Fig. 1 is a perspective view of the present invention;

14 Fig. 2 is an exploded diagram of the invention; and

15 Fig. 3 is a cross-sectional view of the invention.

16 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

17 A preferred embodiment of the present invention will now be described
18 with reference to the accompanying drawings.

19 Fig. 1 presents an in-line skate wheel (10) having skew-mounted and self-
20 powered illuminating devices in accordance with the present invention.

21 Figs. 2, 3 illustrate the structure of the present invention, including a first
22 and a second anchor (11) (12), a rotor (13) and a stator (14) held between the two
23 coupled anchors (11) (12), multiple illuminating devices (15) installed on the
24 rotor (13) with a skew angle, an axle (17) extending through the two coupled

1 anchors (11) (12) and the stator (14), and a protective covering (18) formed
2 around the circumference of the two coupled anchors (11) (12).

3 The wheel (10) is mounted on the axle (17) of the in-line skate or skate
4 board, which is formed by mutually coupling the first and second anchors (11)
5 (12), each having a recessed portion (112) (122) on the side of one anchor
6 opposing each other, such that when the two coupled anchors (11) (12) are joined
7 together, the two recessed portions (112) (122) are combined to produce a
8 chamber for accommodating the rotor (13) and the stator (14) between the two
9 coupled anchors (11) (12).

10 The ring-shaped rotor (13) is formed by a ring-shaped induction coil and
11 two metal plates, wherein the induction coil is formed by a wire wound around a
12 circular core, and then the two metal plates are joined together holding the
13 induction coil in the middle. The two metal plates are joined by welding, wherein
14 a first end of the induction coil is directly and electrically connected to the
15 mutually coupled metal plates for boosting the efficiency of power generation.
16 The rotor (13) rotates synchronously with the motion of the anchors (11) (12), as
17 opposed to the stator (14).

18 The multiple illuminating devices (15) are installed on the rotor (13) with a
19 skew angle, wherein each illuminating device (15) is inserted at a 45 degrees
20 skew angle in relation to the rotor (13) positioned in an upright direction. The
21 illuminating device (15) may be a light emitting diode (LED). Each illuminating
22 device (15) has two terminals, one terminal being electrically connected to the
23 metal plates of the rotor (13), and another terminal being connected to a second
24 end of the induction coil.

1 The stator (14) is fitted in the rotor, but not in physical contact with the rotor
2 (13), wherein the stator (14) may be a ring-shaped permanent magnet.

3 Multiple pairs of projected portion (114) and sunken portion (124) are
4 formed on the rim of the two coupled anchors (11) (12). The projected portions
5 (114) are located on the first anchor (11), and the sunken portions (124) are
6 located on the second anchor (12). When the two anchors (11) (12) are mutually
7 coupled, a volume is created by each pair of combined projected portion (114)
8 and sunken portion (124), wherein the volume created by the projected portion
9 (114) and sunken portion (124) has a skewness that corresponds with the skew
10 angle of the corresponding illuminating device (15), such that the illuminating
11 device (15) can be inserted into the volume space created by the corresponding
12 projected portion (114) and sunken portion (124) with a predetermined angle,
13 located on the rim of the coupled anchors (11) (12).

14 The axle (17) is installed through the two coupled anchors (11) (12) and the
15 stator (14), having the stator (14) fixed on the axle (17), such that the rotor (13)
16 revolves around the axle (17) in step with the motion of the wheel (10), whereas
17 the stator (14) is stationary.

18 Two bearing sleeves (16)(162) are fitted in respective notches formed onto
19 the outer side of the two coupled anchors (11) (12) as opposed to the side facing
20 each other to receive the axle (17) that extends through the space in the center of
21 the anchors (11) (12).

22 The protective covering (18) is formed on the circumference of the two
23 coupled anchors (11) (12), wherein the protective covering (18) is made of
24 polyurethane (PU) materials by injection molding and covers the circumference

1 and the lateral sides of the two anchors (11) (12) and binds the two anchors (11)
2 (12).

3 When the in-line skate or skate board equipped with the present skate
4 wheels is put to use, the protective covering (18) and the two coupled anchors
5 (11) (12) rotate synchronously with the motion of the wheel, causing the rotor
6 (13) to revolve synchronously against the stator (14). The rotation of the rotor
7 (13) will cause the embedded induction coil to cut across the magnetic flux of the
8 stator (14), thus producing electric current that can light up the illuminating
9 device (15). The light given out by the illuminating device (15) of the in-line
10 skate or skate board can help boost the animation effects during skating.

11 With the illuminating device (15) positioned with a skew angle on the two
12 coupled anchors (11) (12), the light emitted by the illuminating device (15) is
13 able to irradiate from the translucent protective covering (18) with an angle, and
14 the embedded illuminating device (15) can be protected by the protective
15 covering (18) and the anchors (11) (12). Therefore, the present design of the
16 skate wheel can prevent scratching of the illuminating device (15) against the
17 ground or by other obstacles that would otherwise cause abrasion on the surface
18 of the illuminating device (15).

19 Further, with the illuminating device (15) installed with a skew angle or
20 embedded in the rotor (13), the illuminating device (15) does not take up any
21 extra space on the circumference of the coupled anchors (11) (12). Therefore, the
22 diameter requirement for the wheel (10) can be reduced in size to allow the skate
23 wheel to be fitted on in-line skates or skate boards that can only accommodate
24 small diameter wheels.

1 The foregoing description of the preferred embodiments of the present
2 invention is intended to be illustrative only and, under no circumstances, should
3 the scope of the present invention be so restricted, and changes may be made in
4 detail, especially in matters of shape, size, and arrangement of parts within the
5 principles of the invention to the full extent indicated by the broad general
6 meaning of the terms in which the appended claims are expressed.